

REMARKS

This Amendment is submitted in response to the final Office Action mailed on October 18, 2010. A Request for Continued Examination ("RCE") (\$810.00) is submitted herewith. The Director is authorized to charge \$810.00 for the RCE and any additional fees which may be required, or to credit any overpayment to Deposit Account No. 02-1818. If such a withdrawal is made, please indicate the Attorney Docket No. 3712174-00608 on the account statement.

Claims 8 and 10-26 are pending in this application. Claims 1-7 and 9 were previously canceled without prejudice or disclaimer. In the Office Action, the Amendment dated August 3, 2010 is objected to as introducing new matter. Claims 8, 14, 19-20 and 23-24 are rejected under 35 U.S.C. §112. Claims 8, 11, 14, 18 and 25-26 are rejected under 35 U.S.C. §102. Claims 8 and 10-26 are rejected under 35 U.S.C. §103. In response, Claims 8 and 14 have been amended, Claims 25-26 have been canceled and Claims 27-32 have been newly added. The amendments do not add new matter. The new claims do not add new matter. At least in view of the amendments and/or for the reasons set forth below, Applicants respectfully submit that the rejections should be withdrawn.

In the Office Action, the Amendment filed August 3, 2010 is objected to under 35 U.S.C. §132(a) as introducing new matter into the disclosure. Specifically, the Patent Office asserts that the originally filed specification does not provide adequate support for newly amended paragraph 45 of the Specification and Claims 19-20 and 23-24 reversing the order of the water-insoluble polymer and the monomer having a stimuli-responsive functional group to recite that a "dry volume ratio of the monomer having a stimuli-responsive functional group to the water-insoluble polymer is between 100:5 to 100:100." See, Office Action, page 2, lines 18-22; page 3, lines 1-10. The Patent Office admits that the dry volume ratios shown in Examples 1-3 are within the amended range for the case of acrylic acid as the stimuli-responsive monomer but nevertheless asserts that "this is by no means adequate support to invert the entire fundamental recitation as originally filed, for all stimuli-responsive polymer[s] or monomer[s]." See, Office Action, page 3, lines 13-18.

In response, Applicants respectfully note that the only paragraphs in the originally filed Specification disclosing a volume ratio of the water-insoluble polymer and the monomer having a stimuli-responsive functional group are the second paragraph on page 10 (corresponding to paragraph 45 of the PG publication) and the paragraphs describing Examples 1-3 on pages 12-15 (corresponding to paragraphs 58-85 of the PG publication). As admitted by the Patent Office, all

of the examples disclose a hydrogen in which the dry volume ratios of the monomer having a stimuli-responsive functional group to the water-insoluble polymer is 100:40. See, Office Action, page 3, lines 14-15; Specification, paragraphs 58-85. As such, one of ordinary skill in the art would understand that the discussion of volume ratios in the second paragraph on page 10 of the originally filed disclosure was a typo that was instead intended to recite that the volume ratio of the monomer having a stimuli-responsive functional group to the water-insoluble polymer is between 100:5 to 100:100.

Contrary to the Patent Office's assertion, the Amendment on August 3, 2010 does not "fundamentally change" the originally filed subject matter, since the originally filed subject matter included examples in which the dry volume ratio of the monomer to the water-insoluble polymer was 100:40 (i.e., within the claimed range). See, Specification, paragraphs 58-85. Although the examples only described acrylic acid as the stimuli-responsive monomer, one of ordinary skill in the art would have understood that this ratio applied to all stimuli-responsive monomers and that the use of acrylic acid as a specific monomer in the *examples* was merely illustrative.

Moreover, Applicants respectfully submit that the Patent Office's proposed interpretation of the originally filed Specification would be inconsistent. For example, the Patent Office proposes interpreting paragraphs 58-85 as showing a hydrogel in which the dry volume ratio of acrylic acid monomer to water-insoluble polymer (i.e., poly(methyl methacrylate), polystyrene and poly(vinylidene fluoride) ("PVdF")) is 100:40 (2.5). See, Office Action, page 3, lines 10-15. Yet the Patent Office asserts that paragraph 45 should also be interpreted as describing a hydrogel in which the dry volume ratio of water-insoluble polymer to stimuli-responsive monomer (e.g., acrylic acid) is between 100:5 (20) and 100:100 (1). See, Office Action, page 3, lines 1-18. However, if paragraph 45 is interpreted as the Patent Office suggests, the dry volume ratio of stimuli-responsive monomer to the water-insoluble polymer would be 100:100 (1) to 5:100 (0.05), and the 100:40 (2.5) ratio of acrylic acid monomer to water-insoluble polymer in the examples would be outside the range recited in paragraph 45. Thus, one of ordinary skill in the art would have understood that the ratio intended to be recited on page 10 of the originally filed Specification is that disclosed in the originally filed examples and currently recited in amended paragraph 45 and Claims 19-20 and 23-24.

Accordingly, Applicants respectfully request that the objections to the Amendment dated August 3, 2010 be withdrawn.

In the Office Action, Claims 8, 14, 19-20 and 23-24 are rejected under 35 U.S.C. §112, first paragraph, for failure to comply with the written description requirement. With respect to Claims 8 and 14, the Patent Office asserts that the Specification supports a limitation of “wherein the water insoluble polymer is contained within the hydrogel,” but does not support forming a phase separation structure within the hydrogel. See, Office Action, page 4, lines 7-17. In response, though Applicants do not agree with this assertion, Claims 8 and 14 have been amended to recite a water-insoluble polymer incorporated within the hydrogel. These amendments do not add new matter. The amendments are supported in the Specification at, for example, page 1, paragraphs 17-18; pages 1-2, paragraph 19; page 2, paragraphs 20 and 25-28; page 3, paragraphs 39, 43 and 46; page 4, paragraphs 62 and 69; page 5, paragraph 77.

With respect to Claims 19-20 and 23-24, the Patent Office asserts that the Specification fails to provide support for the limitation of the claimed “dry” volume ratio. See, Office Action, page 4, lines 18-20. Specifically, the Patent Office asserts that the Specification as originally filed does not support the newly amended term of a dry ratio, “and there is no mention of the use of dry ratio on page 12, par 3, where the volume ratio of these two components is discussed.” See, Office Action, page 4, line 22; page 5, lines 1-3. In response, Applicants note that *all* of the examples recite the “*dry* volume” of water-insoluble polymer. See, Specification, page 4, paragraphs 59-60 and 66-67; page 5, paragraphs 73-74.

In response to Applicants’ arguments, the Patent Office asserts that the examples are not commensurate in scope with the claims because the only dry volume ratio given in the examples is 40:100, which only provides a ratio at a single point, rather than spanning the entire claimed range. See, Office Action, page 5, lines 5-8. However, the examples are merely illustrative and need not list every possible ratio within the claimed range. Moreover, one of ordinary skill in the art would understand that the ratio disclosed in paragraph 45 of the Specification is a “dry” ratio because the examples illustrating such limitation clearly list the ratios as “dry” volume ratios. See, Specification, page 4, paragraphs 59-60 and 66-67; page 5, paragraphs 73-74. The Patent Office further asserts that “in the entirety of the current claims, nowhere are recited specific polymer species.” See, Office Action, page 5, lines 8-9. However, currently amended Claims 8 and 14 expressly recite that the water-insoluble polymer is selected from the group consisting of poly(methyl methacrylate)s, polystyrenes and poly(vinylidene fluoride)s. As such, Applicants respectfully submit that the claims are adequately supported by the Specification.

Accordingly, Applicants respectfully request that the rejection of Claims 8, 14, 19-20 and 23-24 under 35 U.S.C. §112, first paragraph, be withdrawn.

In the Office Action, Claims 8, 11, 14, 18 and 25-26 are rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent Publication No. 2002/0001571 A1 to Wu et al. ("*Wu*"). In response, Applicants have amended Claims 8 and 14. In view of the amendments and/or for at least the reasons set forth below, Applicants respectfully submit that *Wu* fails to disclose each and every element of independent Claims 8 and 14 and Claims 11 and 18 that depend therefrom.

Independent Claims 8 and 14 recite, in part, a stimuli-responsive polymer hydrogel comprising: a water-insoluble polymer incorporated within the hydrogel, wherein the water-insoluble polymer is a polymer without a cross-linking point; and a stimuli-responsive polymer, wherein the polymer hydrogel is capable of gelating as a result of absorbing and swelling with water and capable of changing its degree of swelling and/or volume in response to a stimulus, and wherein the water-insoluble polymer is selected from the group consisting of poly(methyl methacrylate)s, polystyrenes and poly(vinylidene fluoride)s. The amendments do not add new matter. The amendments are supported in the Specification at, for example, page 1, paragraphs 17-18; pages 1-2, paragraph 19; page 2, paragraphs 20 and 25-28; page 3, paragraphs 39, 43 and 46; page 4, paragraphs 62 and 69; page 5, paragraph 77. By incorporating a water-insoluble polymer that does not have a cross-linking point as a reinforcer within the hydrogel, the breaking strength of the hydrogel can be improved without the reinforcer dissolving out of the gel. See, Specification, page 2, paragraphs 20 and 26-28. In contrast, *Wu* fails to disclose every element of the present claims.

For example, *Wu* fails to disclose or suggest a stimuli-responsive polymer hydrogel wherein the water-insoluble polymer is a polymer without a cross-linking point and wherein the water-insoluble polymer is selected from the group consisting of poly(methyl methacrylate)s, polystyrenes and poly(vinylidene fluoride)s as required, in part, by independent Claims 8 and 14. The Patent Office asserts that "[t]he second polymers of Wu include. . . cellulose. . . [and] cellulose, at least, constitutes a polymer having no cross-linking point." See, Office Action, page 6, lines 13-19. In response, Applicants have amended Claims 8 and 14 to recite that the water-insoluble polymer does not have a cross-linking point and is selected from the group consisting of poly(methyl methacrylate)s, polystyrenes and poly(vinylidene fluoride)s. Therefore, even if cellulose is a polymer having no cross-linking point, cellulose cannot satisfy the claimed water-insoluble polymer limitation. With respect to the polystyrene and poly(methyl methacrylate)

disclosed in *Wu*, one of ordinary skill in the art would understand that polystyrene may be cross-linked depending on its physical properties. Therefore, merely because *Wu* discloses polystyrene and poly(methyl methacrylate) does not necessarily mean that such polymers are without a cross-linking point. In fact, nowhere does *Wu* teach or suggest that its polystyrene or poly(methyl methacrylate) are without a cross-linking point.

Moreover, *Wu* fails to disclose or suggest a water-insoluble polymer incorporated within the hydrogel, wherein the polymer hydrogel is capable of gelating as a result of absorbing and swelling with water and capable of changing its degree of swelling and/or volume in response to a stimulus as required, in part, by independent Claims 8 and 14. The Patent Office asserts that *Wu* teaches a second hydrophobic polymer which is incorporated within a stimuli-responsive polymer particle. See, Office Action, page 6, lines 8-9; *Wu*, Abstract, lines 5-7. However, the portion of *Wu* relied on by the Patent Office merely states that “Incorporated *with* this [stimuli-responsive] particle is a second polymer.” See, *Wu*, Abstract, lines 5-7. Nowhere does *Wu* teach or suggest that the second polymer is incorporated *within* a stimuli-responsive polymer hydrogel.

Instead, *Wu* clarifies that its “incorporated with” language merely means that already polymerized stimuli-responsive particles are *mixed with* the second, hydrophobic, polymer to form a composite membrane. See, *Wu*, pages 1-2, paragraph 11; page 2, paragraphs 12-13, 16-20 and 23; page 3, paragraph 41. For example, *Wu* teaches that its stimuli-responsive polymer nanoparticles are either: (1) dispersed in a solution of the second polymer and dried; or (2) melted with the second polymer to form a composite membrane. See, *Wu*, page 3, paragraph 41; page 4, paragraph 54. Nowhere does *Wu* disclose or suggest that the second polymer is incorporated within a stimuli-responsive polymer hydrogel. In fact, because the stimuli-responsive polymer is already polymerized and formed into nanoparticles before mixing with the second polymer, Applicants respectfully submit that one of ordinary skill in the art would understand that the second polymer of *Wu* is merely “mixed with,” not incorporated within, the stimuli-responsive polymer.

In response to Applicants’ arguments, the Patent Office asserts that in Applicants’ examples, the water-insoluble polymer appears to be added as an already polymerized structure and, thus, “it does not appear that the teachings of *Wu* to add an already polymerized water-insoluble polymer are contrary to the instant Claims.” See, Office Action, page 10, lines 14-20. However, Applicants respectfully note that the issue is not whether the water-insoluble polymer is already polymerized but instead whether the stimuli-responsive polymer is already

polymerized when it is added to the water-insoluble polymer. For example, the present Specification teaches that the stimuli-responsive monomer is mixed with the water-insoluble polymer and a polymerization initiator and then polymerized in a solution of the water-insoluble polymer to form a stimuli-responsive polymer hydrogel containing the water-insoluble polymer within the hydrogel as a reinforcer. See, Specification, page 2, paragraphs 23-24; page 4, paragraphs 59-62 and 66-69; page 5, paragraphs 73-76. In contrast, *Wu* teaches polymerizing its stimuli-responsive monomer particles and then mixing the particles with a second polymer. See, *Wu*, pages 1-2, paragraph 11; page 2, paragraphs 12-13, 16-20 and 23; page 3, paragraph 41. Thus, contrary to the Patent Office's assertion, *Wu* fails to disclose a water-insoluble polymer incorporated within the hydrogel in accordance with the present claims.

Accordingly, Applicants respectfully request that the rejection of Claims 8, 11, 14, 18 and 25-26 under 35 U.S.C. §102(b) to *Wu* be withdrawn.

In the Office Action, Claims 8 and 10-26 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,331,578 B1 to Turner ("*Turner*"). For at least the reasons set forth below, Applicants respectfully submit that *Turner* fails to disclose or render obvious each and every element of the present claims.

For example, *Turner* fails to disclose or suggest a stimuli-responsive polymer hydrogel wherein the water-insoluble polymer is a polymer without a cross-linking point as required, in part, by independent Claims 8 and 14. The Patent Office asserts that *Turner* discloses an interpenetrating network of a hydrophilic polymer and a hydrophobic polymer. See, Office Action, page 7, lines 11-13. The Patent Office further asserts that "if there is a polystyrene which has no crosslinking point available, and used by applicant, then *Turner*'s polystyrene reads on polystyrene [*sic*] including this particular embodiment." See, Office Action, page 11, lines 7-9. However, contrary to the Patent Office's assertions, one of ordinary skill in the art would understand that polystyrene may be cross-linked depending on its physical properties. Therefore, merely because *Turner* discloses polystyrene does not mean *Turner* necessarily discloses polystyrene without a cross-linking point. In fact, *Turner* itself expressly teaches that its hydrophobic polymer may be cross-linked. See, *Turner*, column 9, lines 27-29 and 39-67; column 10, lines 1-10. For example, *Turner* states that: "In the preferred embodiment both or all polymeric components are crosslinked. . . . The host polymer network may be chosen from suitable hydrophobic polymers that may include. . . polystyrene (PS)." See, *Turner*, column 9, lines 27-29 and 42-48.

In response to Applicants' arguments, the Patent Office asserts that although *Turner* teaches suitable cross-linking agents for vinyl containing siloxanes, PTMO and other siloxanes, "[c]rosslinkers enumerated for polystyrene are conspicuously absent." See, Office Action, page 11, lines 9-14. However, *Turner*'s failure to specifically mention a cross-linker for polystyrene does not necessarily mean that its polystyrene is without a cross-linking point. To the contrary, the portion of *Turner* cited by the Patent Office is directed to IPNs, and *Turner* repeatedly discloses cross-linking the "polymerizable reactants" of its IPNs, which includes first and second polymers which are each polymerizable reactants. See, *Turner*, Abstract; column 5, lines 16-54 and 65-67; column 6, lines 1-15; column 9, lines 49-66. As such, *Turner* teaches that both the first and second polymers are cross-linked in forming its IPN.

The Patent Office further asserts that polystyrene is fairly inert and typically a more reactive monomer such as divinylbenzene must be included in order to cross-link polystyrene and, thus, a polystyrene homopolymer would not be cross-linkable. See, Office Action, page 11, lines 16-21; page 12, lines 1-3. In response, Applicants respectfully submit that *Turner* teaches using a polystyrene polymer as its hydrophobic polymer and further teaches that the hydrophobic polymer (i.e., polystyrene) is cross-linked to form an IPN. See, *Turner*, column 9, lines 27-29 and 39-67; column 10, lines 1-10.

In response to Applicants' arguments, the Patent Office asserts that *Turner* teaches semi-IPNs in which one or more of the polymer components remains linear and that it would have been obvious to one of ordinary skill in the art to employ the hydrophobic component as the linear component. See, Office Action, page 7, lines 7-9 and 16-22. However, nowhere does *Turner* teach that its hydrophobic-hydrophilic networks may be employed in semi-IPNs such that one of the hydrophilic-hydrophobic polymer components remains linear. Instead, *Turner* merely states that "semi-IPNs may also be prepared in which one or more of the polymer components remains linear." See, *Turner*, column 9, lines 30-31. Although the portions of *Turner* discussing semi-IPNs and hydrophilic-hydrophobic IPNs are in the same paragraph, as the Patent Office admits, they are "explicit *alternatives*" to each other. See, Office Action, page 12, lines 13-14; *Turner*, column 9, lines 12-31. As such, one of ordinary skill in the art would have no reason to combine *Turner*'s teaching of semi-IPNs with its teaching of hydrophilic-hydrophobic IPNs as an alternative to semi-IPNs. Furthermore, even if the hydrophilic-hydrophobic polymers could be used in a semi-IPN, *Turner* fails to disclose that the hydrophobic polymer in a semi-IPN could be polystyrene, or that such hydrophobic polymer would be the component which remains linear.

For similar reasons, Applicants respectfully submit that *Turner* fails to disclose polymerizing a monomer having a stimuli-responsive functional group with a cross-linker in a solution of a water-insoluble polymer, wherein the water-insoluble polymer is a polymer without a cross-linking point as required, in part, by Claims 12-13.

Accordingly, Applicants respectfully request that the rejection of Claims 8 and 10-26 under 35 U.S.C. §103(a) to *Turner* be withdrawn.

Applicants further note that Claims 27-32 have been newly added. The new Claims are fully supported in the Specification at, for example, page 3, paragraphs 39 and 52; page 4, paragraphs 58-59, 62, 66-67 and 69; page 5, paragraphs 72-73, 76 and 88. No new matter has been added thereby. Applicants respectfully submit that the subject matter as defined in the newly added claims is patentable over the cited art for at least substantially the same reasons discussed above.

For the foregoing reasons, Applicants respectfully submit that the present application is in condition for allowance and earnestly solicit reconsideration of same.

Respectfully submitted,

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